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ON THE CHORDS OF A PARABOLA AND GENERALLY OF A CONIC.

By PROF. F. AMODEO, Naples, Italy.

I propose to show that the properties of the focal chords of a parabola given by Prof. Graves in a recent number of the ANNALS*, are common to all the chords of a parabola.

Let PP' be any chord of a parabola, T its pole, N the point of intersection of the parallels through P and P' to the tangents TP', TP. The line TN is the diameter of the parabola conjugate to the chord PP'.

Each chord PN, $P'N$ divides the other in the ratio $1:3$.

If M, M' be the other ends of the chords PN, $P'N$, the chord joining MM' is parallel to PP' and three times as long.

Let us join the point T with one of the points S of the chord PP', and let T' be the point of intersection of the line TS with the chord MM'.

The line TT' is divided by S in the ratio $1:4$.

Revolving the chord PP' around S, the point T will describe a right line s the polar of S, the point T' will describe another right line s', parallel to s, and therefore the envelope of the chord MM' is a parabola tangent to the chord s' at its middle point, having in common with the original parabola the point at infinity, and the pole S.

If the point S moves on the chord PP', we shall have an infinite number of parabolas, all tangent to the original parabola at the point at infinity, and to the chord MM' parallel to PP'.

Only two parabolas are bitangent to the original parabola, and they are those that correspond to the positions P, P' of the point S.

This property of the chords of a parabola is a special case of the following property of the chords of any conic.

Let P, P', P'' be three points of a conic, p, p', p'' their tangents, and M, M' the projections, on the conic, from P, P' of the points $p'p''$, pp''. If P, P', p, p' vary, the chord PP' revolving around one of its points S, the envelope of the chord MM' is a conic tangent to the original conic at P'', and having in common with it the pole S.

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*See Vol. III. p. 153.